Fusion3

EDGE 3D Printer
F200 3D Printer

FILAMENT HANDLING

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How to properly store filament with your Fusion3 EDGE & F200 3D printers.

INTRODUCTION

NOTE: Fusion3 printers use 1.75mm filament only.

We have always subscribed to the notion that quality and care of the filament that you use will have a tremendous impact on the ease of operation and results from your Fusion3 3D printer. With that in mind, here are some best practices and tips to help you get the most out of your filament and your EDGE & F200 3D printers.

STORING FILAMENT - MOISTURE & DUST

When not in use (at the completion of each print), filament should be stored in a sealed, dry environment.

- Minimum: Resealable bag with desiccant packs inside.
- Better: Plastic tub with rubber gasket lid, reusable desiccant packs inside.
- Best: Active filament dryer.

Dust:

Over time, dust can accumulate in the filament path and print head, causing print issues and jams.

The filament wipe feature of your 3D printer's extruder will remove some of the dust, but not guaranteed to catch everything.

Moisture:

All thermoplastics absorb moisture from the air. Some absorb more than others; some are more sensitive to moisture during printing than others.

New Filament May Contain Moisture

Despite what you may think, a brand-new roll of filament may contain moisture out-of-the-box.

- Plastic film is moisture-permeable. This means the vacuum sealing bags manufacturers use to seal their filament will, over time, allow moisture to permeate into the filament.
- Depending on how long it sat on a shelf in a warehouse, it may have absorbed moisture.
- Desiccant only slows down the rate of absorption, it does not prevent it or reverse it. So desiccant packs in the vacuum bag with the filament help, but don't solve the problem.

How to Tell if Your Material is Too Wet:

When you load the filament into the printer, you may see one or more of the following signs that you have excessive moisture in the filament:

- Steam coming off the stream of molten plastic exiting the nozzle.
- Bubbles forming in the stream of molten plastic exiting the nozzle. Sometimes these do not form until the plastic is 3-6" away from the nozzle, so look at the cooled and solidified coil of filament on the bed. You may see bubbles as a textured surface, lumpy filament, pockets or divots, or discoloration.
- Snapping or popping noises as the moisture boils off as molten filament exits the nozzle. Remember we're talking about small amounts of moisture so these noises are not loud like popcorn popping, but more like a mouse chewing.

If you print with wet material, you may observe the following characteristics in your finished part:

- Greatly diminished part strength.
- Weak layer bonds.
- Poor surface finish (lumpy, bumpy, textured, pockmarked, discolored).

What Materials are Most Sensitive to Moisture?
The materials most sensitive to humidity are Nylon and fiber-filled polycarbonate. In high humidity environments such as the Southeast US in the summer, print quality can degrade in as little as 8 hours even in an office environment with HVAC running.

How To Remove Moisture From Your 3d Printing Filament

For almost all materials except PLA, this moisture will need to be periodically removed in order to maintain good print quality.

The best way to remove moisture from your filament is to use an active filament dryer. This is an oven-like device that heats the air to drive moisture out of the filament. These devices will run at a constant temperature of around 120-140 F, creating a warm, arid environment that will coax the moisture from the filament without melting the material.

NOTE: Do not store PLA or other materials with a low glass transition temperature in an actively heated filament dryer. These materials will deform and possibly melt, making them unusable for 3D printing.

3D printing materials are packed with desiccant. Most people think that desiccant removes moisture. However, that is not the case, it merely slows down the rate of absorption.

Do Not Store Filament in Heated Filament Dryers Continuously

Fusion3 offers a filament drying solution using a laboratory gravity oven and there are other filament drying solutions offered on the market. These solutions are primarily suited for the drying of filament after use and can be used for storage of filament for up to approximately four (4) weeks.

However, filament should not be stored in the dryer for protracted periods of time. Keeping filament in the dryer for extended periods (months) can cause the composition of the plastic to change which results in difficulty printing.

Also, not all materials are suitable for drying in these dryers. For example, PLA has too low of a glass transition temperature and will soften in these heated environments.

If you do not expect to use your filament within the four week period, we suggest:

1) After use, place the filament in the dryer for 24-48 hours and then store in a sealed zip-lock or similar bag with desiccant.
2) Prior to use after storage in the bags, place in the dryer again for 24-48 hours to re-dry as the bags may not be fully sealed and may have absorbed some new moisture since.